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**EUROPEAN PATENT APPLICATION**

(21) Application number : **91302881.7**

(51) Int. Cl.<sup>5</sup> : **B65B 21/06, B65G 37/00**

(22) Date of filing : **02.04.91**

(30) Priority : **04.04.90 GB 9007599**

(43) Date of publication of application :  
**09.10.91 Bulletin 91/41**

(84) Designated Contracting States :  
**BE DE ES FR GB IT NL**

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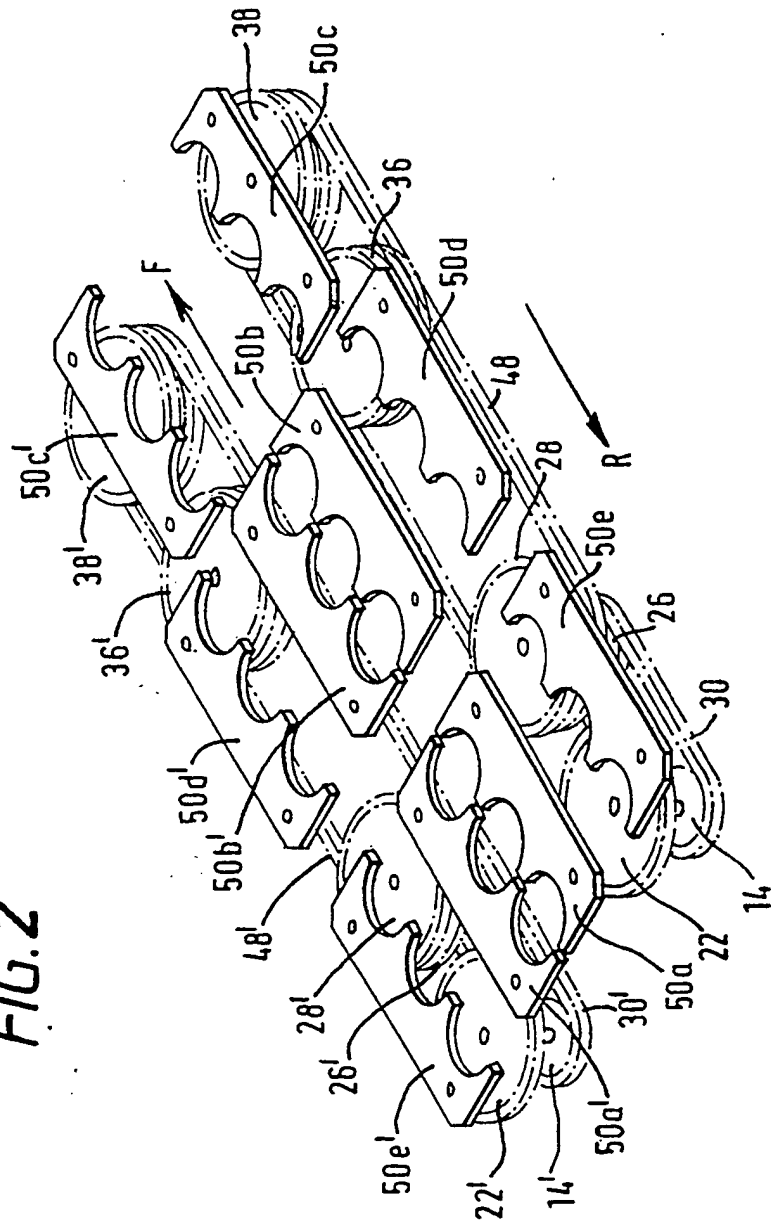
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(54) **Spacer and conveyor mechanism.**

(57) A packaging machine in which containers are conveyed along a feed path (f) and formed into groups for subsequent packaging has a spacer and conveying mechanism (10) comprising a series of spacer and conveyor elements (50) arranged to move along a working path in the feed direction and convey the containers in the feed path (f) and, after releasing the containers move along a parallel return path (R) opposite to the feed direction. Each spacer element is mounted in an endless chain by a connector (58) and guide element (60) at opposite ends thereof.

FIG. 2



This invention relates to a spacer and conveyor mechanism of a packaging machine which correctly spaces individual articles (preferably containers such as those used in the food industry for yoghurt desserts and drinks) to form a group and which conveys the group of spaced articles along a feed path of the mechanism whereafter they are packaged into a multi-article package.

EP-A-0 126 553 discloses a spacer and conveyor mechanism in which spacer and conveyor elements have operative faces comprising a series of recesses by which articles in the feed path of the mechanisms are spaced apart to form a group which is conveyed along the feed path. The spacer and conveyor elements are mounted on a set of endless chains comprising an upper chain and a lower chain which are vertically aligned but longitudinally offset in the direction of the feed path. Each spacer and conveyor element has a leading edge attached to one of the chains and a trailing edge attached to the other of the chains and is driven thereby along a working path in the feed direction to convey the articles and, after releasing the articles, moves along a parallel return path opposite to the feed direction.

Whereas this known mechanism is satisfactory for use with bottles and cans, its overall vertical height is too great for grouping and conveying smaller containers such as plastics pots used for dairy, dessert and some beverage products.

In the present invention, the vertical height of the mechanism is reduced by providing a different arrangement in which only one endless chain is utilised so that the mechanism is suitable for such products.

The invention provides in a packaging machine in which articles are conveyed along a feed path and formed into groups for subsequent packaging, a spacer and conveying mechanism comprising a series of spacer and conveyor elements arranged to move along a working path in the feed direction and convey said articles in the feed path and, after releasing said articles, move along a parallel return path (R) opposite to the feed direction, said spacer elements being constrained to move from the return path into the working path, and vice versa, transversely of the feed direction and held throughout their movement so that the operative faces thereof face toward said feed path, characterised in that each of said spacer and conveyor elements is mounted on an endless chain by means of a connector adjacent one end of said element and a guide element being provided at the opposite end of said element said endless chain, connector and guide elements cooperating with sprocket sets at opposite ends of said mechanism which comprise superposed sprockets.

According to a feature of the invention, a pair of sprocket sets may be provided at each end of the mechanism in which the sprocket sets of each pair are

offset longitudinally in the direction of the feed path by an amount which is substantially equal to the distance between said connector and said guide element of each spacer and conveyor element. In constructions where this feature is adopted, a pair of guides may extend between the endmost sprocket sets about which said endless chain is entrained and in which the endless chain, said connector and said guide element is guided. Preferably, said guides are formed by channels in longitudinally extending plastics blocks.

According to another feature of the invention, the sprocket sets about which said endless chain is entrained may each comprise a pair of like superposed sprockets comprising an upper guide sprocket with which said connector and said guide element of each spacer and conveyor element cooperates and a lower chain sprocket with which said endless chain cooperates. Preferably, said upper and lower sprockets are integral.

According to yet another feature of the invention, the operative face of each of said spacer and conveyor elements may comprise a series of recesses for forming said articles into groups and conveying said groups along the feed path. In constructions where a series of recesses are provided, the recesses may be formed in a platform detachably connected to a support block from which said connector and said guide element extend.

An embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

FIGURE 1 is a vertical cross-sectional view of the spacer and conveyor mechanism according to the invention;

FIGURE 2 is a schematic perspective view of two complementary mechanisms mounted side-by-side as viewed from the outfeed end thereof; and FIGURE 3 is a plan view of the spacer and conveyor mechanism.

Referring to the drawings, the spacer and conveyor mechanism 10 comprises a chain and sprocket set shown generally by the reference 12. The mechanism is adapted to be installed in a packaging machine adjacent the infeed end of the machine and normally two complementary mechanisms are installed in side-by-side relationship, as shown in Figure 2 so that a container feed path is provided between the mechanisms in which like parts are designated like reference numerals with the addition of suffix "a". Only one such mechanism is described below in detail, it being understood that the other complementary mechanism is similar in all respects.

Mechanism 10 comprises a drive sprocket 14 which is keyed onto upright shaft 16 journaled in bearings 18 and 18a respectively. The base of shaft 16 carries a gear 20 through which the drive sprocket is rotatably driven from a suitable drive source via a gear box (not shown). A guide sprocket 22 is mounted

atop drive sprocket 14 on shaft 16 and will be further referred to below.

The drive sprocket transmits rotational drive to sprocket set 24 comprising driven sprocket 26 and twin sprocket 28 by means of endless drive chain 30 (shown schematically) entrained about sprockets 14 and 26. Both the twin sprocket 28 and driven sprocket 26 are mounted upon upright shaft 32 rotatably journaled in bearings 34 and 34a. Twin sprocket 28 comprises an upper guide sprocket 28a and a lower integral chain sprocket 28b.

Mechanism 10 comprises two further twin sprocket sets 36 and 38, respectively, spaced longitudinally of and aligned with twin sprocket 28. Twin sprocket 36 comprises an upper guide sprocket 36a and a lower integral chain sprocket 36b mounted for rotation about fixed shaft 40 by means of rolling bearings 42 and 42a. Similarly, twin sprocket 38 comprises an upper guide sprocket 38a and a lower integral chain sprocket 38b mounted for rotation about fixed shaft 44 by means of rolling bearings 46 and 46a.

An endless chain 48 (shown schematically) is entrained about chain sprockets 28b and 38b and engages chain sprocket 36b by which rotational drive is transmitted to all the twin sprocket sets.

Chain 48 carries a series of five like spacer and conveyor elements 50 each of which has a support block 52 and an upper platform 54. An operative face of the platform comprises a series of recesses R1-R3 by which containers e.g. plastics pots, delivered to the feed path are spaced apart by a predetermined amount corresponding to the spacing of the recesses R1-R3 to form a group and the group of spaced articles is conveyed along the feed path by the spacer and conveyor element.

The configuration of the operative face of the spacer and conveyor elements can vary depending on the size and/or shape of the article to be conveyed. Indeed, platform 54 is detachably connected to support block 52 by fasteners 56 whereby the platform itself and/or the support block may be substituted by another of different size.

Each spacer and conveyor element has a leading end 50a which carries a securing pin 58 extending downwardly from the support block 52 and which attaches the spacer and conveyor element to chain 48. Intermediate its ends, the securing pin also cooperates with the guide sprockets when the mechanism is operative. The trailing end of the spacer and conveyor element has a guide stud 60 extending downwardly for cooperation with the guide sprockets of the mechanism.

Between the endmost sprockets 22 and 38 of the mechanism chain 48 is guided along longitudinal guideways 62 and 64 which are disposed radially outwardly of the sprocket sets one on each longitudinal side of the mechanism. Guideways 62 and 64 are formed

in longitudinally extending plastics blocks 66 and 68 respectively and superposed arcuate guideways are also formed in the blocks adjacent the peripheral extremities of sprockets 22 and 36 to allow for the transverse movement of the spacer and conveyor elements from the working path to the return path and vice versa.

In Figure 1, spacer and conveyor element 50 can be assumed to be shown immediately before transfer from the return path R into the feed path F. Thus, the securing pin engages with twin sprocket 28 so that as the chain is carried around sprocket 28b, the intermediate portion of securing pin 58 cooperates with guide sprocket 28, so that securing pin 58 moves out of guideway 62 and into guideway 64 through suitable openings in the guideways. Simultaneously, guide stud 60 is carried by guide sprocket 22 out of the guideway 62 and through arcuate portion 62a and enters the opposite parallel guideway 64 through arcuate portion 64a. Spacer and conveyor element 50 is therefore moved transversely from the return path R to the feed path F such that its operative face is maintained facing the feed path throughout its transverse movement.

Similarly, at the opposite end of the mechanism where the spacer and conveyor element is moved transversely from the feed path to the return path, securing pin 58 passes around twin sprocket 38 whereby its intermediate portion cooperates with guide sprocket 38a. Simultaneously, guide stud 60 is carried through arcuate portion 62b out of guideways 62 and cooperates with sprocket 36a thereby to enter guideway 64 through arcuate portion 64b.

## Claims

1. In a packaging machine in which articles are conveyed along a feed path (F) and formed into groups for subsequent packaging, a spacer and conveying mechanism (10) comprising a series of spacer and conveyor elements (50) arranged to move along said feed path in the feed direction and convey said articles in the feed path (F) and, after releasing said articles, move along a parallel return path (R) opposite to the feed direction, said spacer elements being constrained to move from the return path into the feed path, and vice versa, transversely of the feed direction and held throughout their movement so that the operative faces thereof face toward said feed path, characterised in that each of said spacer and conveyor elements is mounted on an endless chain (48) by means of a connector (58) adjacent one end of said element and a guide element (60) provided at the opposite end of said element, said endless chain, connector and guide elements cooperating with sprocket sets at opposite ends of said

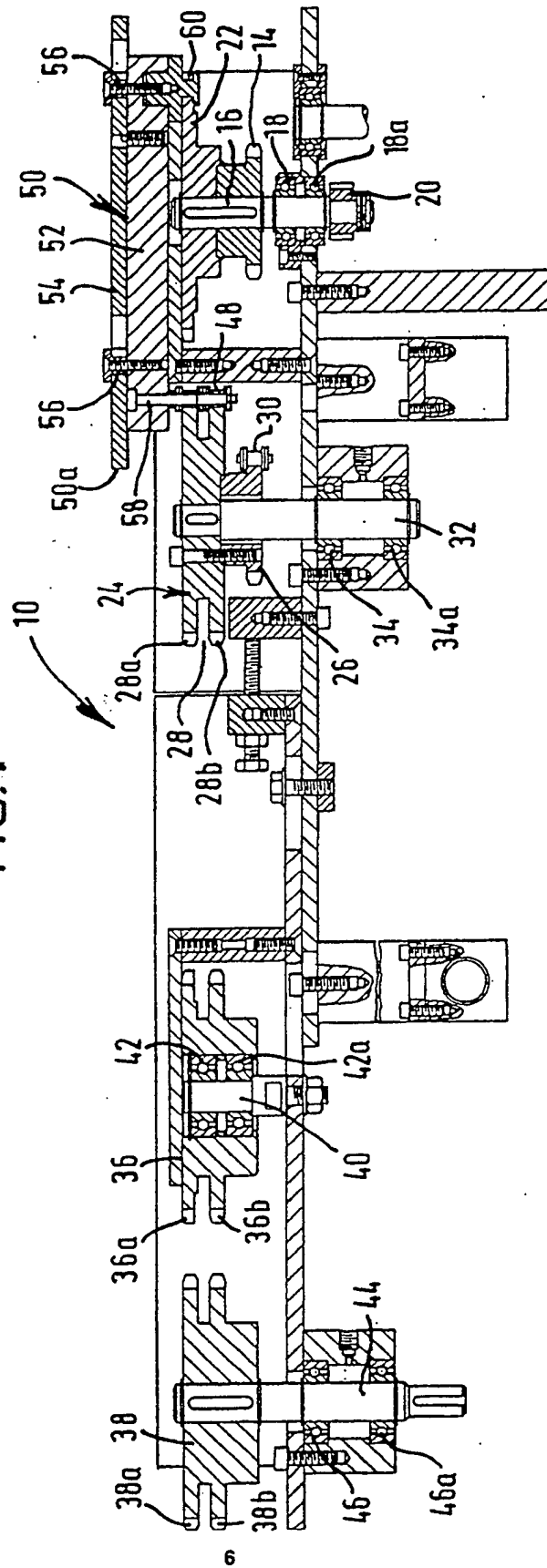
mechanism which comprise superposed sprockets (22, 14; 28; 36; 38).

2. A mechanism according to claim 1, wherein a pair of sprocket sets (14, 22, 28; 36, 38) are provided at each end of the mechanism in which the sprocket sets of each pair are offset longitudinally in the direction of the feed path by an amount which is substantially equal to the distance between said connector and said guide element of each spacer and conveyor element. 5 10
3. A mechanism according to claim 2, wherein a pair of guides (62, 64) extend between the endmost sprocket sets about which said endless chain is entrained and in which the endless chain, said connector and said guide element is guided. 15
4. A mechanism according to claim 3, wherein said guides are formed by channels in longitudinally extending plastics blocks (66, 68). 20
5. A mechanism according to any of the preceding claims wherein the sprocket sets about which said endless chain is entrained each comprise a pair of like superposed sprockets comprising an upper guide sprocket (22, 28a, 36a, 38a) with which said connector and said guide element of each spacer and conveyor element cooperates and a lower chain sprocket (28b, 36b, 38b) with which said endless chain cooperates. 25 30
6. A mechanism according to claim 5 wherein said upper and lower sprockets are integral. 35
7. A mechanism according to any of the preceding claims wherein the operative face of each of said spacer and conveyor elements comprises a series of recesses (R1-R3) for forming said articles into groups and conveying said groups along the feed path. 40
8. A mechanism according to claim 7, wherein the recesses are formed in a platform (54) detachably connected to a support block (52) from which said connector and said guide element extend. 45

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FIG. 1



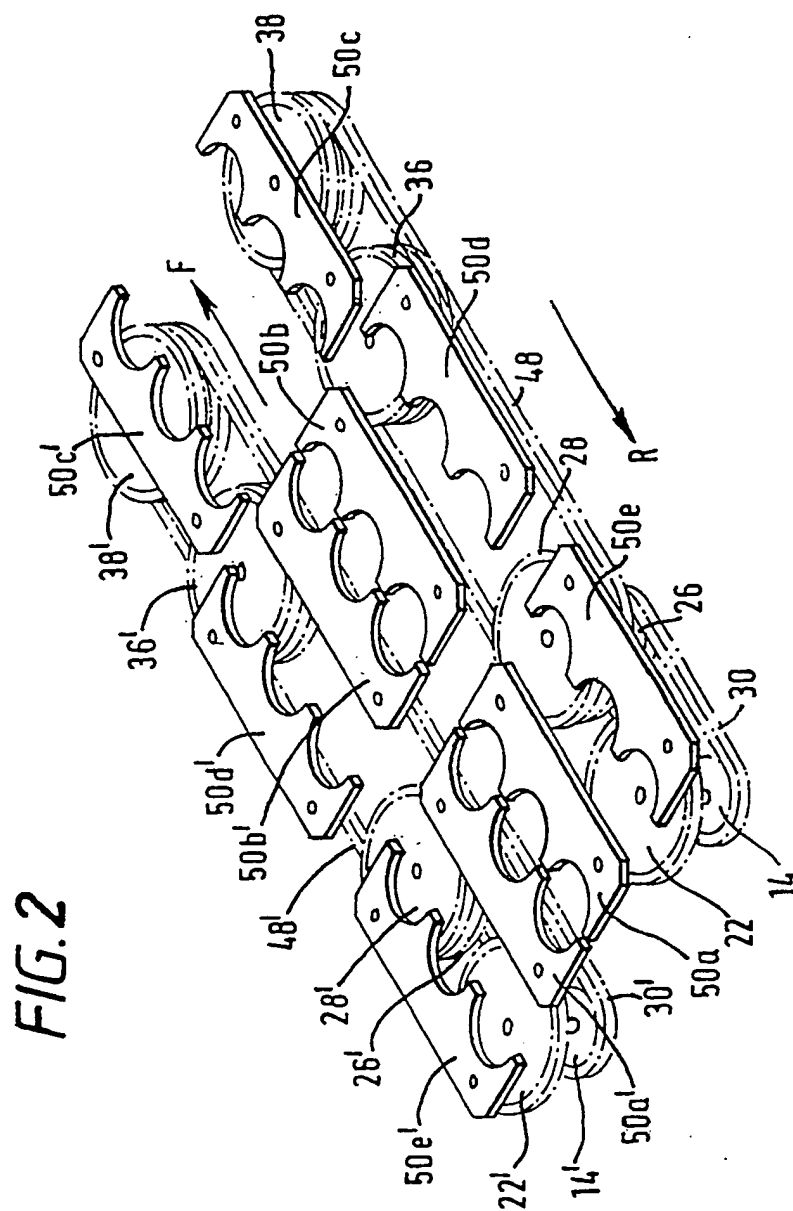
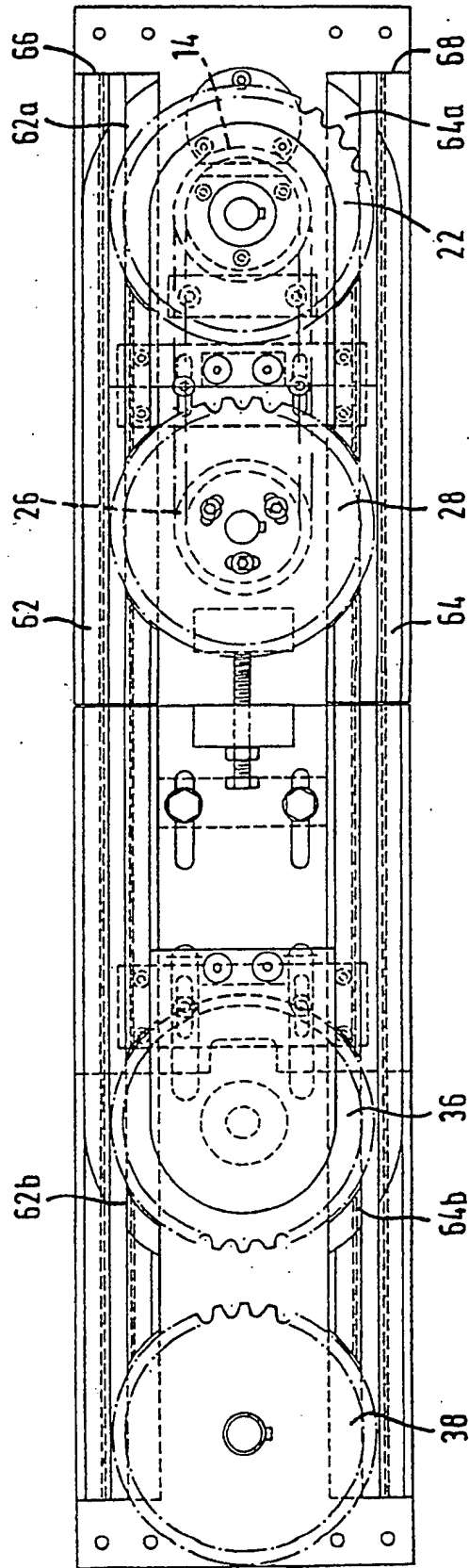


FIG. 3







European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 91 30 2881

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	EP-A-126 553 (HEAD CORPORATION) * page 7, line 1 - page 9, line 8; figures * ---	1,7	B65B21/06 B65G37/00
A	GB-A-974 995 (OLIN MATHIESON) * page 2, line 97 - page 4, line 71; figures * ---	1	
A	US-A-4 757 893 (L. SHABRAM) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65B B65G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 25 JUNE 1991	Examiner JAGUSIAK A.H.G.
CATEGORY OF CITED DOCUMENTS		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application f. : document cited for other reasons ..... A : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03.92 (P001)

